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Patent claims

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1. A toroidal gearbox comprising a central shaft on which an annular central disk having a toroidal friction surface and an annular main cylinder belonging to a hydraulic pressure device are respectively
10 disposed in a rotationally secure and concentric manner, and in which the main cylinder, which can be supported against an axial counter-bearing, is assigned a radial partition wall for the formation of two working pressure chambers in which there is
15 respectively accommodated an axial pressure piston, the pressurization of which gives rise to an axial actuation of the central disk arranged in an axially displaceable manner relative to the central shaft, so that contact pressures can be brought to bear against
20 the friction surface, and in which the significant pressure piston, which is situated on that side of the partition wall facing away from the central disk, is arranged in a motionally fixed manner relative to a mechanical actuating means in the form of an axial
25 projection, which passes through a corresponding opening in the partition wall and acts upon the central disk in addition to the direct actuation thereof by the direct pressure piston situated on that side of the partition wall facing the central disk, characterized
30 in that the projection (11 or 11a) assigned in a motionally fixed manner as a mechanical actuating means to the significant pressure piston (9 or 9a) is configured annularly and coaxially to the pressure piston (9 or 9a) and also passes through the central
35 opening (13 or 13a) in the partition wall (5 or 5a).
(fig. 1+1a).

2. The toroidal gearbox as claimed in patent claim 1,

characterized in that the coaxial projection (11 or 11a) of the significant pressure piston (9 or 9a) is guided in a pressure-resistant manner in the central opening (13 or 13a) in the partition wall (5 or 5a).
5 (fig. 1+1a).

3. The toroidal gearbox as claimed in patent claim 1 or 2, characterized in that the significant pressure piston (9 or 9a) has a concentric cylindrical outer
10 face (14 or 14a), which is guided in a pressure-resistant and axially displaceable manner in a corresponding cylindrical inner face (15 or 15a) of the partition wall (5 or 5a). (fig. 1+1a).

15 4. The toroidal gearbox as claimed in one of patent claims 1 to 3, characterized in that the direct pressure piston (8 or 8a), which is situated on that side of the partition wall (5 or 5a) facing the central disk (32 or 32a) and directly actuates the central disk
20 (32 or 32a), is guided with its cylindrical outer shell (35 or 35a), in a pressure-resistant manner, directly against the corresponding inner shell (44 or 44a) of the main cylinder (4 or 4a). (fig. 1+1a).

25 5. The toroidal gearbox as claimed in patent claim 4, characterized in that the direct pressure piston (8), which is situated on that side of the partition wall (5) facing the central disk (32) and directly actuates the central disk (32), cooperates via a ring seal,
30 inserted in a peripheral groove in its cylindrical outer shell (35), with the corresponding inner shell (44) of the main cylinder (4). (fig. 1).

35 6. The toroidal gearbox as claimed in patent claim 4, characterized in that the direct pressure piston (8a), which is situated on that side of the partition wall (5a) facing the central disk (32a) and directly actuates the central disk (32a), cooperates via its

cylindrical outer shell (35a) with a ring seal inserted in an inner peripheral groove in the corresponding inner shell (44a) of the main cylinder (4a). (fig. 1a).

5 7. The toroidal gearbox as claimed in one of patent
claims 1 to 6, characterized in that between the
projection (11a), assigned in a motionally fixed manner
as a mechanical actuating means to the significant
10 pressure piston (9b), and a hub (34a) of the main
cylinder (4a), which hub passes through the projection
(11a), there is provided an axially extending
concentric annular gap, which at its one end emerges
openly in the working pressure chamber (6a) of the
15 direct pressure piston (8a) and at its other end
emerges openly in the working pressure chamber (7a) of
the significant pressure piston (9a). (fig. 1a; [^]fig.
1).

20 8. A toroidal gearbox comprising a central shaft on
which an annular central disk having a toroidal
friction surface and an annular main cylinder belonging
to a hydraulic pressure device are respectively
concentrically disposed, and in which the main
25 cylinder, which can be supported against an axial
counter-bearing, is assigned a radial partition wall
for the formation of two working pressure chambers in
which there is respectively accommodated an axial
pressure piston, the pressurization of which gives rise
to an axial actuation of the central disk arranged in
30 an axially displaceable and rotationally secure manner
relative to the central shaft, so that contact
pressures can be brought to bear against the friction
surface, and in which the significant pressure piston,
which is situated on that side of the partition wall
35 facing away from the central disk, is arranged in a
motionally fixed manner relative to a mechanical
actuating means in the form of an axial projection,

which effectively bypasses the partition wall and acts upon the central disk in addition to the direct actuation thereof by the direct pressure piston situated on that side of the partition wall facing the central disk, characterized in that the projection (11b) assigned in a motionally fixed manner as a mechanical actuating means to the significant pressure piston (9b) is configured annularly and coaxially to the pressure piston (9b) and also reaches radially over the partition wall (5b). (fig. 2).

9. The toroidal gearbox as claimed in one of patent claims 1 to 8, characterized in that the significant pressure piston (9b), at its outer periphery, is guided in a pressure-tight and displaceable manner directly against the cylindrical inner face (44b) of the main cylinder (4b). (fig. 2; [^]fig. 1+1a).

10. The toroidal gearbox as claimed in one of patent claims 1 to 9, characterized in that the partition wall (5 or 5a or 5b) is detachably inserted in the main cylinder (4 or 4a or 4b) and, in the axial direction pointing from the central disk (32 or 32a or 32b) to the significant pressure piston (9 or 9a or 9b), can be axially supported against an axial counter-bearing (47 or 47a or 47b) of the main cylinder (4 or 4a or 4b). (fig. 1+1a+2).

11. The toroidal gearbox as claimed in patent claim 10, characterized in that, as the counter-bearing for the partition wall (5 or 5a), the inner face (47 or 47a) of a radial end wall (16 or 16a) of the main cylinder (4 or 4a) is provided, which delimits the working pressure chamber (7 or 7a) of the significant pressure piston (9 or 9a) (fig. 1+1a; [^]fig. 2).

12. The toroidal gearbox as claimed in patent claim

10, characterized in that, as the counter-bearing for the partition wall (5b), a diameter offset (47b) of a hub (34b) of the main cylinder (4b) is provided, which hub has the central opening (33b) for the passage of
5 the main shaft (31b). (fig. 2).

13. The toroidal gearbox as claimed in one of patent claims 10 to 12, characterized in that the partition wall (5 or 5b), in the axial direction pointing from
10 the end wall (16 or 16b) of the main cylinder (4 or 4b) to the central disk (32 or 32b), can be supported against a locking ring (21 or 21b) inserted in a peripheral groove (20 or 20b) in the main cylinder (4 or 4b). (fig. 1+2).

14. The toroidal gearbox as claimed in one of patent claims 8 to 13, characterized in that the direct pressure piston (8b), which is situated on that side of the partition wall (5b) facing the central disk (32b)
20 and directly actuates the central disk (32b), is guided with a cylindrical outer shell (35b), in a pressure-resistant and displaceable manner, against a corresponding inner shell (36b) of the partition wall (5b). (fig. 2).

15. The toroidal gearbox as claimed in one of patent claims 1 to 14, characterized in that the direct pressure piston (8 or 8a or 8b), which is situated on that side of the partition wall (5 or 5a or 5b) facing
30 the central disk (32 or 32a or 32b) and directly actuates the central disk (32 or 32a or 32b), is guided with a cylindrical inner shell (37 or 37a or 37b), in a pressure-resistant and displaceable manner, against a corresponding outer shell (38 or 38a or 38b) of the
35 main cylinder (4 or 4a or 4b). (fig. 1+1a+2).

16. The toroidal gearbox as claimed in one of patent claims 1 to 9, characterized in that the direct

pressure piston (8 or 8a or 8b), which is situated on that side of the partition wall (5 or 5a or 5b) facing the central disk (32 or 32a or 32b) and directly actuates the central disk (32 or 32a or 32b), is guided with a cylindrical inner shell, in a pressure-resistant and displaceable manner, against a corresponding outer shell of the partition wall (5 or 5a or 5b). ([^]fig. 1+1a+2).

10 17. The toroidal gearbox as claimed in one of patent claims 1 to 16, characterized in that to that pressure chamber (22 or 22a or 22b) of the main cylinder (4 or 4a or 4b) which is enclosed by the significant pressure piston (9 or 9a or 9b) and the partition wall (5 or 5a or 5b) and is passive with respect to the actuation of the central disk (32 or 32a or 32b), a ventilation connection (39 or 39a or 39b) is connected, which communicates with the atmosphere via a ventilated region of an interior of a gearbox housing. (fig. 1+1a+2).

18. The toroidal gearbox as claimed in patent claim 17, characterized in that in the ventilation connection (39 or 39a or 39b) there is effectively interposed a ventilation port (23 or 23a or 23b), which is provided in an outer wall portion (24 or 24a or 24b) of the main cylinder (4 or 4a or 4b) and connects the ventilated region of the interior of the gearbox housing to a ventilated region (40 or 40a or 40b) of the main cylinder (4 or 4a or 4b). (fig. 1+1a+2).

19. The toroidal gearbox as claimed in patent claim 17 or 18, characterized in that the ventilation connection (39 or 39a or 39b) contains a ventilation duct (29 or 29a or 29b) of the partition wall (5a or 5a or 5b), which ventilation duct is effectively interposed between the passive pressure chamber (22 or 22a or 22b)

and the ventilated region (40 or 40a or 40b) of the interior of the main cylinder (4 or 4a or 4b). (fig. 1+1a+2).

5 20. The toroidal gearbox as claimed in patent claim 19, characterized in that the ventilation duct (29b) of the partition wall (5b) is configured as a longitudinal groove on a cylindrical outer casing (41b) of the partition wall (5b). (fig. 2).

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21. The toroidal gearbox as claimed in one of patent claims 1 to 20, characterized in that the central disk (32 or 32a or 32b) has on its outer periphery an axial drive toothing (17 or 17a or 17b), which, for the
15 indirect rotationally secure connection to the central shaft (31 or 31a or 31b), engages in a rotationally secure manner in a corresponding axial drive toothing (18 or 18a or 18b) in the cylindrical outer wall (19 or 19a or 19b), arranged in a rotationally secure manner
20 relative to the main shaft (31 or 31a or 31b), of the main cylinder (4 or 4a or 4b). (fig. 1+1a+2).

22. The toroidal gearbox as claimed in one of patent claims 1 to 21, characterized in that the direct
25 pressure piston (8 or 8a or 8b), which is situated on that side of the partition wall (5 or 5a or 5b) facing the central disk (32 or 32a or 32b) and directly actuates the central disk (32 or 32a or 32b), and the central disk (32 or 32a or 32b) are configured in one
30 piece. (fig. 1+1a+2).

23. A toroidal gearbox comprising a central shaft on which an annular central disk having a toroidal friction surface and an annular cylinder-axial piston
35 servo unit belonging to a hydraulic pressure device are respectively concentrically disposed, and in which the pressurization of the servo unit gives rise to an axial actuation of the central disk arranged in an axially

displaceable and rotationally secure manner relative to the central shaft, so that contact pressures can be brought to bear against the friction surface, and in which the central shaft has a longitudinally running inner pressure duct to which the servo unit is connected, in particular as claimed in one of patent claims 1 to 22, characterized in that in a region of a housing interior of a gearbox housing, which region lies adjacent to the toroidal friction surface (63 or 63a or 63b), there is arranged in a motionally fixed manner relative to the gearbox housing a pressure line (26), which, in dependence on a pressure control unit, can be subjected to working pressure and which is connected, by a line end (27) supplied to the central shaft (31 or 31a or 31b), to the inner pressure duct (25 or 25a or 25b) of the central shaft (31 or 31a or 31b). (fig. 1; [^]fig. 1a+2).

24. A toroidal gearbox comprising a central shaft on which an annular central disk having a toroidal friction surface and an annular main cylinder belonging to a hydraulic pressure device are respectively concentrically disposed, and in which the main cylinder, which can be supported against an axial counter-bearing, is assigned a radial partition wall for the formation of two working pressure chambers in which there is respectively accommodated an axial pressure piston, the pressurization of which gives rise to an axial actuation of the central disk arranged in an axially displaceable and rotationally secure manner relative to the central shaft, so that contact pressures can be brought to bear against the friction surface, and in which axially resilient means effectively supported against the main cylinder act upon the central disk to generate a basic pressure force, in particular as claimed in patent claims 1 to 23, characterized in that the resilient means (61a) for

the basic contact pressure are supported, via the radial partition wall (5a), indirectly against the main cylinder (4a). (fig. 1a).

5 25. The toroidal gearbox as claimed in patent claim
24, characterized in that the resilient means (61a) for
the basic contact pressure are disposed in the working
pressure chamber (6a) for the direct pressure piston
10 (8a), which is situated on that side of the partition
wall (5a) facing the central disk (32a) and directly
actuates the central disk (32a). (fig. 1a).

15 26. The toroidal gearbox as claimed in patent claim
25, characterized in that the resilient means (61a) for
the basic contact pressure act indirectly upon the
central disk (32a) via the direct pressure piston (8a),
which is situated on that side of the partition wall
(5a) facing the central disk (32a) and directly
actuates the central disk (32a). (fig. 1a).